Tool and Die Makers

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What They Do

Almost everything you touch on a daily basis has been created by metal forming—cars, doorknobs, razor blades, paper clips, shovels, beds, skateboards, and musical instruments are just a few examples. Tool and Die Makers set up and operate the tools, dies, jigs, fixtures, and gauges used in mass production machines to manufacture identical parts made of metal or combinations of metal and other materials. Although Tool and Die Makers use common tools and techniques, the resulting products differ. Tool Makers use machine tools to make jigs and fixtures that hold metal parts being shaved, stamped, or drilled. Die Makers craft metal forms, or dies, that shape metal in stamping and forging operations. Tool and die making is fundamental to the manufacturing process.

Tool and Die Makers commonly use computer-aided design (CAD) to develop products and specifications for tools and dies. The designs are then sent to computer numerically controlled (CNC) machines to produce the die. In shops that use numerically controlled (NC) machine tools, Tool and Die Makers often assist in planning and writing NC programs.

Tasks

- Study blueprints or specifications and visualize shape of die, part, or tool.
- Compute dimensions of assembly and plan sequence of operations.
- Measure, mark, and scribe metal or plastic stock to lay out machining, using instruments, such as protractors, micrometers, scribes, and rulers.
- Set up and operate machine tools, such as lathes, milling machines, shapers, and grinders to machine parts.
- Lift, position, and secure machined parts on surface plate or worktable, using hoist, vises, v-blocks, or angle plates.
- Smooth and polish flat and contoured surfaces of parts or tools, using scrapers, abrasive stones, files, emery cloth, or power grinder.
- Design tools, jigs, fixtures, and templates for use as work aids. Cast plastic tools or parts, or tungsten-carbide cutting tips, using pre-made molds.

*Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.*

EDD Employment Development Department State of California
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Important Skills, Knowledge, and Abilities

- Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
- Control Precision — The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.
- Near Vision — The ability to see details at close range (within a few feet of the observer).
- Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- Wrist-Finger Speed — The ability to make fast, simple, repeated movements of the fingers, hands, and wrists.
- Computer — Knowledge of computer hardware and software, including applications and programming.

Work Environment

Most Tool and Die Makers work either in large manufacturing plants or in contract shops that specialize in making tools and dies. These firms are concentrated in urban areas. Work spaces are relatively pleasant and generally quieter and cleaner than production machine shops. Some moderately heavy lifting is involved. As with any use of hand or power tools, injury is possible, but the work is generally safe for those who take reasonable care, use protective equipment, and adhere to safety rules. Companies employing Tool and Die Makers traditionally operate only one shift per day. Overtime and weekend work are common, especially during peak production periods.

Tool and Die Makers could belong to a variety of unions, such as the International Association of Machinists or the United Auto Workers, depending on the industry and employer.

California's Job Outlook and Wages

The California Outlook and Wages table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2004	Estimated Number of Workers 2014	Average Annual Openings	2006 Wage Range (per hour)
Tool and Die Makers				
51-4111	4,600	5,000	140	$16.00 to $26.25

Wages do not reflect self-employment.
***Average annual openings** include new jobs plus net replacements.*
Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

In some industries, the number of products that use parts machined by Tool and Die Makers has been reduced because of the use of electronically controlled machine tools. Manufacturers continue to experience a shortage of qualified experienced and inexperienced Tool and Die Makers despite the use of NC machine tools and the increased importation of finished goods and precision metal products.

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Training/Requirements/Apprenticeships

Tool and Die Makers usually follow one of the following training paths:

- Formal, four-year apprenticeship
- Vocational school
- Community College programs or certificates
- Extensive on-the-job training

Training in the four-year apprenticeship program is spent mostly in the shop and on the job. Information about Tool and Die Maker apprenticeships may be found at www.dir.ca.gov/das, an apprenticeship database maintained by the Division of Apprenticeship Standards. Apprentices learn to operate hand and power tools, and other mechanical equipment. They also study heat-treating and other metal working processes. In addition to shop work, apprentices receive on an average of 144 hours per year of classroom instruction in mathematics, mechanical drawing, tool designing, CAD, tool programming, and blueprint reading.

Many community colleges offer manufacturing technology and machine shop certificates or degrees. Some community colleges offer tool design technology courses. Programs accredited by the National Institute for Metalworking Skills (NIMS) are listed at their Web site.

Recommended High School Course Work
High school students interested in this kind of work should take mathematics, especially trigonometry, as well as metal shop courses.

Where Do I Find the Job?

Candidates for training or apprenticeship programs should apply directly to employers who employ Tool and Die Makers. Community colleges offer assistance in finding jobs to graduates of degree or certificate programs in tool and die making or machine shop. Unions representing Tool and Die Makers also have information concerning apprenticeships and related matters.

Direct application to employers remains one of the most effective job search methods.

Use the *Search for Employers by Industry* feature on the *Career Center* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. Search using keywords from the following manufacturing industry names to get a list of private firms and their addresses:

- All Other Plastics Product
- Aluminum Foundries (except Die-Casting)
- Bolts, Nuts, Screws, Rivets, and Washers
- Machine Shops
- Machine Tool Cutters and Accessories
- Metal Cutting Machine Tool
- Metal Stamping
- Other Aircraft Parts and Equipment
- Precision Turned Product Manufacturing
- Special Tools, Dies, Jigs, and Fixtures
- Temporary Help Services
- Urethane and Other Foam Product

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Search these **yellow page** headings for listings of private firms:

- Die Makers
- Metal Cutting Tools
- Metal Fabricators
- Metal Rolling and Forming
- Metal Stamping
- Plastic Fabricators
- Sheet Metal Work
- Tool Designers

Where Can the Job Lead?

There are several ways for skilled workers to advance. Some move into supervisory and administrative positions in their firms; many obtain their college degree and go into engineering or tool design; and some may start their own shops.

Other Sources of Information

International Association of Machinists and Aerospace Workers
www.iamaw.org

National Institute for Metalworking Skills
www.nims-skills.org

Precision Metalforming Association Educational Foundation
www.pmaef.org